DETAILED TECHNICAL SPECIFICATION OF FRP DISCHARGE ROD-16 FEET 3 STAGE

1. Scope:

The Specification covers the general requirement towards design, manufacturing and testing at manufacturer's site, supply and delivery of Discharge Rod suitable for up to 11kV.

2. Applicable Standards : As per relevant IS with latest amendment (For material used and Testing) like IS-2071, IEC 60060, ASTM-F711, IS 10661-1983, IEC 61235-2019/IS 16622-1993 for FRP discharge rod.

3. Type Test Reports Requirement: The following type test shall be conducted on FRP discharge rod.

a. Dry Power Frequency withstand Test at 110 kV as per IEC 60060(2010)/IS 2071-1 (2016), test shall be carried out (Across the length of every feet) as per ASTM-F711.
b. Wet Power Frequency withstand Test at 110 kV as per IEC 60060(2010)/IS 2071-1 (2016).
c. Lighting Impulse Voltage Withstand Test at 170kVp for both polarities as per IEC 60060(2010)/IS 2071-1 (2016).
d. Measurement of Leakage current before & after humidity Test as per IS 2071-1 (2016). The limits of leakage current shall be as per ASTM-F711, Table-2.
e. Insulation resistance Test.
f. Tensile Strength and Barcole Hardness as per IS 10661-1983
g. Izod Impact test as per ASTMD 256/IS 180.
h. Glass Content Test Minimum 50 to 75%as per IS 10661-1983
i. Bending Test as per IEC 61235 : 1993
j. Crushing Test as per IEC 61235 : 1993
k. To test Dry penetration test: Live working insulation foam filled tubes and solid rods as per IS 13770:1983
l. Flammability Test as per IS 6747-1994.
m. Flexural Strength.
n. Compressive Strength
o. Water Absorption
p. ARC Resistance
q. Heat Distortion Test

4. Definition :

A. FRP Rod: The circular/round rod of a suitable material, mentioned in this technical Specification shall be provided at one end and conductor clamp at another end.
B. Earthing Cable: Cable for connecting electrically with the earthing system.
C. Conductor Clamp: Clamp which is permanently attached to the telescopic rod.
D. Earthing Clamp: Clamp which is permanently attached to the earthing cable and is used to connect to the earth / Ground.

5. General And Construction Requirements Of Earthing Discharge Rod

A. FRP Telescopic Stick: 1 Set (Comprising of three sticks)

- The Circular/Round shape FRP Telescopic Earthing Rod shall be designed for built in safety to the operator in the event the rod comes in contact with the live line during intended earthing/discharging operation. The FRP Telescopic Earthing Rod shall be of push button type.
- Locking system shall be manufactured from high grade insulating materials and light in weight.
- Earthing rod shall be of Rovings Pultrusion tubes made out of Fiber Reinforced Polyester (FRP) with boron free glass rowing with Interlocking buttons. The glass content should be minimum 50%-75% as per standards.
- The top section of discharge stick should be filled with polyurethane foam to avoid moisture to get in.
- Total Extendable length of the Discharge Stick shall be minimum 16 feet. Total Number of Section used to manufacture 16 feet telescopic Discharge stick shall be 3 nos. The telescopic rod shall have closed height -7 feet and extended height -16Feet. The Top section of the Discharge Stick should be Foam filled to prevent from moisture. The outer Diameter of stick shall be as follow: Top Section : 25 mm, middle section: 32, Bottom Section : 40 mm. The Wall Thickness of the sections used to manufacture Discharge Stick should be minimum 3 mm.
- All the required sticks should be provided with Special Spring Loaded self- locking system with Guided couplers. Total Weight of the Discharge Stick should not be more than **5.7 kgs** (weight of the rod: 2.7kg + weight of the cable and bottom earthing clamp is **2.3kg+ weight of electrode along with chain- 0.7kgs).**
- The Earthing rod should have very good mechanical strength, di-electric strength and free from water absorption.
- The Telescopic Stick shall be of Yellow Colour.
- Tolerance for all sizes/meters/length/Dia: **±5%**

B. Conductor clamp

A. The Top stick of Discharge Stick must be provided with Die- Cast aluminium alloy conductor clamp.
B. The Conductor Clamp should be suitable to Earth the electric system and also Mount Non contact sensor to check the Live line.

C. Earthing Cable :

The Earthing Rod should be provided with ISI marked PVC insulated single core copper conductor of 16sqmm. The cable shall be minimum 10 mtrs in length connected with conductor clamp of Discharge stick and grounding C clamp at both the ends. Both the ends of the earthing cable should be provided with copper lugs crimped with wire.

D. Bottom Clamp/Grounding Clamp:

The bottom end of the Telescopic Stick should be dressed with adequate Hand Grip to prevent the penetration of moisture from underneath, thus making the device completely moisture proof. The Stick should be provided with Aluminium casted Grounding C clamp suitable to grip minimum 30 mm thick. The grounding clamp shall be provided with T Bolt for manual tightening along with a round GI earth electrode of 12mm by 12 inch with a pointed edge on one side of the electrode and other end with GI chain of approximately 1 feet length connecting to the grounding C-clamp.

Special Features:

The Telescopic stick should be free from all the foreign bodies and without any pin holes.

- The Inner and outer surface of Earthing Rod (Telescopic stick) should be smooth and glossy.
- The Earthing Rod shall have very good mechanical strength, excellent Di-Electrical strength and free from the water absorption.
- The weight of Earthing Rod should be suitable for easier handling/Operation by single person.
- The sticks shall be free from all foreign bodies and without any pin holes.

6. Packing and Marking :

The each Earthing Stick should be suitably packed in "Medium Duty cotton tarpaulin canvas bag with shoulder strap" with Logo and letters of "BESCOM" in English and " ಬೆಎಿಕಂ" in Kannada on the bag with a shoulder strap.

The Earthing stick should be marked with the following Information :
A- Name of Manufacture
B- Year of Manufacturing

C- Batch No

D-LOGO and Letters "BESCOM" and "OPERTATE WITH GLOVES FOR SAFETY" should be embossed on the Telescopic stick at every meter length preferably at 50mm from one end.

E- Black line across the rod should be there for easy identification of push button locking.

7. INSPECTION OF MATERIALS:

All the material shall be accepted subject to following Pre-Dispatch Inspection:

a. Visual Inspection.
b. Dimensional Check
c. Dry Power Frequency withstand Test at 110 kV as per IEC 60060(2010)/IS 2071-1 (2016) at factory/ CPRI/ ERDA or any NABL Accredited Govt testing labs for selected samples.
d. AC Di-electric Strength Test for 100 kV Per feet on FRP Rod: The Test voltage of 100 kV AC rms applied between H.V. Terminals and Earth (Across the length of 1 feet) as per ASTM-F711 for selected samples.
e. Insulation Resistance Test on device shall be more than 1 Gohm as per general requirement for selected samples.
f. Manufacturer shall have in house testing facility for dry power frequency test or shall make arrangements for testing at factory/ CPRI/ ERDA or any NABL Accredited Govt testing labs for selected samples and declaration for the same shall be submitted by bidder.

General Manager (Ele)
Quality Standards & Safety,
BESCOM